2.3 Complementary and Supplementary Angles

Goal Find measures of complementary and supplementary angles.

VOCABULARY

Complementary angles

Complement

Supplementary angles

Supplement

Adjacent angles

Theorem

Follow-Up **Think of a way to help you remember the meaning of each term.**

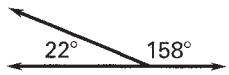
Complementary angles

Supplementary angles

Example 1 *Identify Angles*

State whether the angles are *complementary*, *supplementary*, or *neither*.

a.



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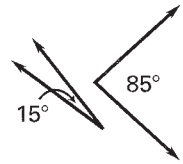
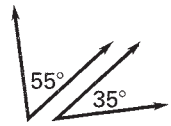


c.



Solution

a. Because $22° + 158° =$ _____, the angles are _____.

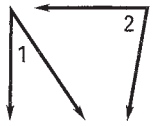
b. Because $15° + 85° =$ _____, the angles are _____.

c. Because $55° + 35° =$ _____, the angles are _____.

Example 2 *Identify Adjacent Angles*

State whether the numbered angles are *adjacent* or *nonadjacent*.

a.



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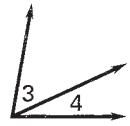

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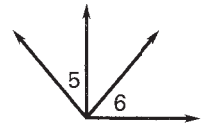


Solution

a. Because the angles do not share a common vertex or side, $\angle 1$ and $\angle 2$ are _____.

b. Because the angles share a common _____ and _____, $\angle 3$ and $\angle 4$ are _____.

c. Although $\angle 5$ and $\angle 6$ share a common _____, they do not share a common _____. Therefore, $\angle 5$ and $\angle 6$ are _____.

Example 3 ***Complements and Supplements***

a. $\angle A$ is a complement of $\angle C$, and $m\angle A = 47°$. Find $m\angle C$.

b. $\angle P$ is a supplement of $\angle R$, and $m\angle R = 36°$. Find $m\angle P$.

Solution

a. $\angle A$ and $\angle C$ are complements, so $m\angle A + m\angle C =$ ____.

____ $+ m\angle C =$ ____ **Substitute for $m\angle A$.**

$m\angle C =$ ____ **Solve for $m\angle C$.**

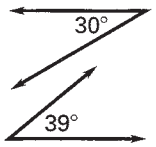
b. $\angle P$ and $\angle R$ are supplements, so $m\angle P + m\angle R =$ ____.

$m\angle P +$ ____ $=$ ____ **Substitute for $m\angle R$.**

$m\angle P =$ ____ **Solve for $m\angle P$.**

✔ ***Checkpoint*** **State whether the angles are *complementary*, *supplementary*, or *neither*.**

1.



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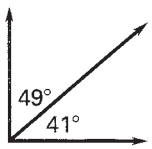

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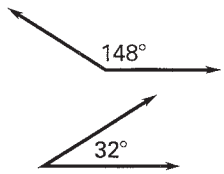


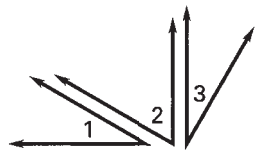
4. $\angle B$ is a complement of $\angle D$, and $m\angle D = 79°$. Find $m\angle B$.

5. $\angle G$ is a supplement of $\angle H$, and $m\angle G = 115°$. Find $m\angle H$.

THEOREM 2.1: CONGRUENT COMPLEMENTS THEOREM

Words If two angles are complementary to the same angle, then they are _____.

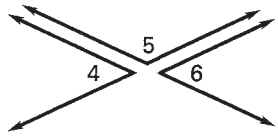
Symbols If $m\angle 1 + m\angle 2 = 90°$ and $m\angle 2 + m\angle 3 = 90°$, then $\angle\_\_ \cong \angle\_\_$.



THEOREM 2.2: CONGRUENT SUPPLEMENTS THEOREM

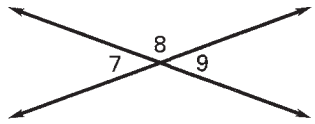
Words If two angles are supplementary to the same angle, then they are _____.

Symbols If $m\angle 4 + m\angle 5 = 180°$ and $m\angle 5 + m\angle 6 = 180°$, then $\angle\_\_ \cong \angle\_\_$.



Example 4 ***Use a Theorem***

$\angle 7$ and $\angle 8$ are supplementary, and $\angle 8$ and $\angle 9$ are supplementary. Name a pair of congruent angles. Explain your reasoning.



Solution

$\angle 7$ and $\angle 9$ are both _____ to $\angle 8$. So, from the Congruent _____ Theorem, it is true that $\angle\_\_ \cong \angle\_\_$.

✔ ***Checkpoint*** **Complete the following exercise.**

6. In the diagram, $m\angle 10 + m\angle 11 = 90°$, and $m\angle 11 + m\angle 12 = 90°$. Name a pair of congruent angles. Explain your reasoning.